



Animal and
Plant Health
Inspection
Service

Policy and Program
Development

Environmental and Risk
Analysis Services

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Document Processing Desk [6(a)(2)]
Office of Pesticide Programs (7504P)
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460-0001

SUBJECT: FIFRA, Section 6(a)(2): Non-target species exposure to diphacinone from Diphacinone-50: Pelleted Rodenticide Bait for Conservation Purposes (EPA Reg. No. 56228-35) in the Kahanahaiki Management Unit, Makua Military Reservation, Oahu, Hawaii

The U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA APHIS) is submitting an adverse effects incident report to comply with the reporting requirements of Section 6(a)(2) of the Federal Insecticide, Fungicide and Rodenticide Act.

Incident Information

<i>Product name:</i>	Diphacinone-50: Pelleted Rodenticide Bait for Conservation Purposes	-013
<i>Registrant name:</i>	USDA APHIS	
<i>EPA Registration No.:</i>	56228-35	
<i>Active ingredient:</i>	0.005% diphacinone (CAS No. 82-66-6)	
<i>Bait formulation:</i>	Pelleted bait	
<i>Product application:</i>	In compliance with label directions	
<i>Incident category:</i>	W-B	
<i>No. of incidents:</i>	1	
<i>Location of incident:</i>	Kahanahaiki Management Unit, Makua Military Reservation, Oahu, Hawaii	

Incident description:

In November 2015, the U.S. Army's Oahu Army National Resources Program conducted a field study within the Kahanahaiki Management Unit (KMU) to test whether the USDA APHIS's Diphacinone-50: Pelleted Rodenticide Bait for Conservation Purposes (D-50) was effective for seasonal control of invasive *Rattus* species when applied using hand-broadcast and canopy satchel application methods. The purpose of rat control efforts in the KMU is to try to help stabilize or increase native plant and snail populations that are negatively impacted by rats. The application was in compliance with all label directions and use restrictions.

Concurrently, the USDA APHIS Wildlife Services (WS) National Wildlife Research Center (NWRC) conducted a monitoring study to evaluate the impacts of this control effort on non-target species. For the purposes of this monitoring study, all invasive rodents listed on the label (rats and house mice) were considered target species. Carcass searches and opportunistic sampling of

target and non-target species were conducted within the KMU before and after the application of D-50 (Attachment 1). Only one carcass of a non-target species, a male mongoose (*Herpestes auropunctatus*; an invasive species in Hawaii), was found during the study and it was found post-application. All other non-target animals sampled pre- and post-application were alive and appeared healthy at the time of collection.

Tissue residue analysis for diphacinone was conducted on all target and non-target animals sampled at USDA APHIS WS NWRC Chemistry laboratory in Fort Collins, Colorado. The analytical chemistry method used to characterize diphacinone residues is outlined in the attached report, "NWRC Invoice #: 16-014" (Attachment 2). Residues in liver tissue were characterized for each individual of sampled birds and mammals. For the arthropods (insects and amphipods), gastropods, or skinks sampled at one time or at a single location, multiple individuals of the same species or taxonomic group were usually grouped together as composite samples in order to obtain sufficient amounts of tissue as required for the analysis. Therefore, diphacinone residues reported for these composite samples represent an average across multiple individuals.

All residue analysis results for all target and non-target animals sampled pre- and post-application in the monitoring study can be found in Attachments 1 and 2. Of note, there were no diphacinone residues detected in any of the target or non-target animals sampled before the application of D-50 (Attachments 1 and 2). Also, the 2 game birds (1 *Francolinus erckelii* and 1 *Lophura leucomelanos*), 1 red-vented bulbul bird (*Pycnonotus cafer*), 1 white-rumped shama bird (*Copsychus malabaricus*), and all 5 skinks (*Lampropholis delicata*) that were live-sampled post-application did not have detectable diphacinone residues (Attachments 1 and 2).

Residues of diphacinone were detected in the liver of the dead mongoose that was found post-application, in 4 red-billed leiothrix birds (*Leiothrix lutea*) sampled alive post-application, and in a number of gastropods and insects that were sampled alive post-application (Attachments 1 and 2). Only the samples in which diphacinone residues were detected are included in the table below. When a sample was analyzed more than once, the highest value measured was reported in the table below.

Sample ID	Sample Collection Date	Species	Number of Individuals in Sample	Tissue Type Analyzed	Diphacinone Residue (ppm)
S160225-85	11/19/15	Mongoose (<i>Herpestes auropunctatus</i>)	1	Liver	0.809
S160225-46	11/24/15	Red-billed leiothrix bird (<i>Leiothrix lutea</i>)	1	Liver	1.17*
S160225-47	12/1/15	Red-billed leiothrix bird (<i>Leiothrix lutea</i>)	1	Liver	0.535*
S160225-67	11/18/15	Red-billed leiothrix bird (<i>Leiothrix lutea</i>)	1	Liver	0.862
S160225-70	12/1/15	Red-billed leiothrix bird (<i>Leiothrix lutea</i>)	1	Liver	0.503*
S160225-43	11/28/15	Snail (<i>Euglandina rosea</i>)	1	Whole body	0.364
S160225-52	11/25/15	Slug (<i>Deroceras</i> spp. and <i>Limax maximus</i>)	Approx. 15	Whole body	3.53
S160225-54	11/25/15	Slug (<i>Deroceras</i> spp. and <i>Limax maximus</i>)	Approx. 12	Whole body	9.83

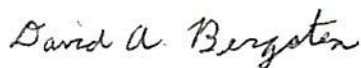
Sample ID	Sample Collection Date	Species	Number of Individuals in Sample	Tissue Type Analyzed	Diphacinone Residue (ppm)
S160225-64	11/18/15	Slug (<i>Deroceras</i> spp. and <i>Limax maximus</i>)	4	Whole body	4.67*
S160225-65	11/17/15	Snail (<i>Euglandina rosea</i>)	1	Whole body	1.08
S160225-69	11/12/15	Slug (<i>Limax maximus</i>)	4	Whole body	0.180
S160225-76	11/9/15-11/13/15	Slug (<i>Deroceras</i> spp.)	13	Whole body	5.65
S160225-48	11/25/15	Sap beetle (Family Nitidulidae)	Approx. 50	Whole body	0.0462†
S160225-49	11/25/15	Earwig (Order Dermaptera)	Approx. 30	Whole body	0.130
S160255-51	11/25/15	Rove beetle (Family Staphylinidae)	Approx. 40	Whole body	0.402
S160225-53	11/25/15	American cockroach (<i>Periplaneta americana</i>)	1	Whole body	0.244*
S160225-75	November 2015	Caterpillar (species unknown)	1	Whole body	0.0301*†
S160225-77	11/12/15	American cockroach (<i>Periplaneta americana</i>)	1	Whole body	0.312
S160225-78	11/18/15-11/19/15	Cockroaches and beetles (multiple species)	9	Whole body	0.362*
S160225-89	11/19/15	Earwig (Order Dermaptera)	13	Whole body	0.189

* = Mass of sample was below the recommended minimum for the method. Results should be viewed critically.

† = Sample result was less than the Quantitation Limit of the method (Attachment 2). Results should be viewed as qualitative only.

If you have any questions regarding this notification, please contact Jim Warren of USDA APHIS Environmental Risk and Analysis Services at (202)316-3216 or Jim.E.Warren@aphis.usda.gov.

Sincerely,



David A. Bergsten
Assistant Chief, Environmental and Risk Analysis Services

cc:

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Attachment 1

Sample ID	Sample Collection Date	Species	Number of Individuals in Sample	Pre- or Post- Application	Residue Analysis Date	Tissue Type Analyzed	Diphacinone Concentration (µg/g)
S160225-01	9/30/2015	Kalij game bird (<i>Lophura leucomelanos</i>)	1	PRE	4/11/2016	Avian Liver	ND
S160225-02	8/27/2015	Mongoose (<i>Herpestes auropunctatus</i>)	1	PRE	4/14/2016	Mammal Liver	ND
S160225-03	8/27/2015	Mongoose (<i>Herpestes auropunctatus</i>)	1	PRE	4/14/2016	Mammal Liver	ND
S160225-04	9/29/2015	Red-billed leiothrix bird (<i>Leiothrix lutea</i>)	1	PRE	‡	‡	‡
S160225-05	9/29/2015	Red-billed leiothrix bird (<i>Leiothrix lutea</i>)	1	PRE	4/11/2016	Avian Liver	ND
S160225-06	9/29/2015	Black rat (<i>Rattus rattus</i>)	1	PRE	4/14/2016	Mammal Liver	ND
S160225-07	9/29/2015	Polynesian rat (<i>Rattus exulans</i>)	1	PRE	4/14/2016	Mammal Liver	ND
S160225-08	9/29/2015	Skinks (<i>Lampropholis delicata</i>)	3	PRE	4/27/2016	Whole Body	ND
S160225-09	9/29/2015	Skinks (<i>Lampropholis delicata</i>)	2	PRE	4/27/2016	Whole Body	ND
S160225-10	9/29/2015	Skinks (<i>Lampropholis delicata</i>)	3	PRE	4/27/2016	Whole Body	ND
S160225-11	9/29/2015	Slug (<i>Limax maximus</i>)	1	PRE	4/22/2016	Whole Body	ND
S160225-12	9/29/2015	Mongoose (<i>Herpestes auropunctatus</i>)	1	PRE	4/14/2016	Mammal Liver	ND
S160225-13	10/29/2015	Slugs (<i>Limax maximus</i> and <i>Deroceras</i> spp.)	2	PRE	4/22/2016	Whole Body	ND
S160225-14	9/24/2015	Mongoose (<i>Herpestes auropunctatus</i>)	1	PRE	4/14/2016	Mammal Liver	ND
S160225-15	10/31/2015	Slugs (<i>Limax maximus</i>)	Multiple	PRE	4/22/2016	Whole Body	ND
S160225-16	10/31/2015	Snail (<i>Euglandina rosea</i>)	1	PRE	4/22/2016	Whole Body	ND
S160225-17	9/22/2015	Cat (<i>Felis catus</i>)	1	PRE	4/14/2016	Mammal Liver	ND
S160225-17	-	-	-	-	5/9/2016	Mammal Liver	ND
S160225-18	9/23/2015	Cockroaches (multiple species)	5	PRE	4/22/2016	Whole Body	ND*
S160225-19	9/23/2015	Slugs (<i>Deroceras</i> spp. and <i>Megmatium</i> spp.)	4	PRE	4/22/2016	Whole Body	ND
S160225-20	9/22/2015	Skinks (<i>Lampropholis delicata</i>)	3	PRE	4/27/2016	Whole Body	ND
S160225-21	9/22/2015	Skinks (<i>Lampropholis delicata</i>)	6	PRE	4/27/2016	Whole Body	ND
S160225-22	12/18/2014	Black rat (<i>Rattus rattus</i>)	1	PRE	4/14/2016	Mammal Liver	ND
S160225-23	12/18/2014	Black rat (<i>Rattus rattus</i>)	1	PRE	4/14/2016	Mammal Liver	ND
S160225-23	-	-	-	-	5/9/2016	Mammal Liver	ND
S160225-24	12/18/2014	Black rat (<i>Rattus rattus</i>)	1	PRE	4/14/2016	Mammal Liver	ND
S160225-25	12/18/2014	Black rat (<i>Rattus rattus</i>)	1	PRE	4/14/2016	Mammal Liver	ND
S160225-26	12/18/2014	Black rat (<i>Rattus rattus</i>)	1	PRE	4/14/2016	Mammal Liver	ND
S160225-27	10/14/2015	Slugs (<i>Deroceras</i> spp.)	9	PRE	4/22/2016	Whole Body	ND*
S160225-28	10/15/2015	Polynesian rat (<i>Rattus exulans</i>)	1	PRE	5/2/2016	Whole Body	ND
S160225-29	10/15/2015	Black rat (<i>Rattus rattus</i>)	1	PRE	4/14/2016	Mammal Liver	ND

Attachment 1

Sample ID	Sample Collection Date	Species	Number of Individuals in Sample	Pre- or Post- Application	Residue Analysis Date	Tissue Type Analyzed	Diphacinone Concentration (µg/g)
S160225-30	10/15/2015	Red-billed leiothrix bird (<i>Leiothrix lutea</i>)	1	PRE	4/11/2016	Avian Liver	ND*
S160225-31	9/30/2015	Red-billed leiothrix bird (<i>Leiothrix lutea</i>)	1	PRE	4/11/2016	Avian Liver	ND
S160225-32	10/9/2015	Kalij game bird (<i>Lophura leucomelanos</i>)	1	PRE	4/11/2016	Avian Liver	ND
S160225-33	9/30/2015	Ants (<i>Anoplolepis longipes</i>)	Multiple	PRE	4/22/2016	Whole Body	ND*
S160225-34	12/1/2015	Black rat (<i>Rattus rattus</i>)	1	POST	4/18/2016	Mammal Liver	0.286
S160225-35	12/1/2015	Black rat (<i>Rattus rattus</i>)	1	POST	4/18/2016	Mammal Liver	1.29
S160225-36	12/1/2015	Black rat (<i>Rattus rattus</i>)	1	POST	5/2/2016	Whole Body	3.40
S160225-36	-	-	-	-	5/16/2016	Whole Body	3.14
S160225-37	12/1/2015	Polynesian rat (<i>Rattus exulans</i>)	1	POST	4/14/2016	Mammal Liver	0.438
S160225-37	-	-	-	-	5/9/2016	Mammal Liver	0.0993*†
S160225-38	12/1/2015	House mouse (<i>Mus musculus</i>)	1	POST	5/2/2016	Whole Body	2.50
S160225-38	-	-	-	-	5/16/2016	Whole Body	1.41
S160225-39	Unknown	Erckel francolin game bird (<i>Francolinus erckelii</i>)	1	POST	4/11/2016	Avian Liver	ND
S160225-40	12/1/2015	Kalij game bird (<i>Lophura leucomelanos</i>)	1	POST	4/11/2016	Avian Liver	ND
S160225-41	11/25/2015	Black rat (<i>Rattus rattus</i>)	1	POST	4/14/2016	Mammal Liver	11.6
S160225-41	-	-	-	-	5/9/2016	Mammal Liver	11.1
S160225-42	11/25/2015	Cockroaches (multiple species)	17	POST	4/22/2016	Whole Body	ND
S160225-43	11/28/2015	Snail (<i>Euglandina rosea</i>)	1	POST	4/22/2016	Whole Body	0.257
S160225-43	-	-	-	-	5/10/2016	Whole Body	0.364
S160225-44	11/15/2015	House mouse (<i>Mus musculus</i>)	1	POST	4/18/2016	Mammal Liver	3.21*
S160225-45	11/24/2015	White-rumped shama bird (<i>Copsychus malabaricus</i>)	1	POST	4/11/2016	Avian Liver	ND*
S160225-46	11/24/2015	Red-billed leiothrix bird (<i>Leiothrix lutea</i>)	1	POST	4/11/2016	Avian Liver	1.17*
S160225-47	12/1/2015	Red-billed leiothrix bird (<i>Leiothrix lutea</i>)	1	POST	4/11/2016	Avian Liver	0.535*
S160225-48	11/25/2015	Sap beetles (Family Nitidulidae)	Approx. 50	POST	4/22/2016	Whole Body	0.0394†
S160225-48	-	-	-	-	5/10/2016	Whole Body	0.0462†
S160225-49	11/25/2015	Earwigs (Order Dermaptera)	Approx. 30	POST	4/22/2016	Whole Body	0.0977
S160225-49	-	-	-	-	5/16/2016	Whole Body	0.130
S160225-50	11/25/2015	Amphipods (arthropods)	Approx. 100	POST	4/22/2016	Whole Body	ND
S160225-50	-	-	-	-	5/10/2016	Whole Body	ND
S160225-50	-	-	-	-	5/10/2016	Whole Body	ND

Attachment 1

Sample ID	Sample Collection Date	Species	Number of Individuals in Sample	Pre- or Post- Application	Residue Analysis Date	Tissue Type Analyzed	Diphacinone Concentration (µg/g)
S160225-51	11/25/2015	Rove beetles (Family Staphylinidae)	Approx. 40	POST	4/22/2016	Whole Body	0.329
S160225-51	-	-	-	-	5/10/2016	Whole Body	0.402
S160225-52	11/25/2015	Slugs (Deroceras spp. and Limax maximus)	Approx. 15	POST	4/25/2016	Whole Body	3.53
S160225-52	-	-	-	-	5/10/2016	Whole Body	2.99
S160225-53	11/25/2015	American cockroach (Periplaneta americana)	1	POST	4/25/2016	Whole Body	0.244*
S160225-54	11/25/2015	Slugs (Deroceras spp. and Limax maximus)	Approx. 12	POST	4/25/2016	Whole Body	9.83
S160225-54	-	-	-	-	5/10/2016	Whole Body	6.37
S160225-55	11/11/2015	Polynesian rat (Rattus exulans)	1	POST	4/18/2016	Mammal Liver	1.83
S160225-56	11/11/2015	Polynesian rat (Rattus exulans)	1	POST	4/18/2016	Mammal Liver	3.86
S160225-57	11/11/2015	Polynesian rat (Rattus exulans)	1	POST	4/18/2016	Mammal Liver	2.44*
S160225-58	11/11/2015	Polynesian rat (Rattus exulans)	1	POST	4/18/2016	Mammal Liver	1.08
S160225-58	-	-	-	-	5/9/2016	Mammal Liver	1.21
S160225-59	11/11/2015	Polynesian rat (Rattus exulans)	1	POST	4/18/2016	Mammal Liver	0.778*
S160225-60	11/10/2015	Black rat (Rattus rattus)	1	POST	4/18/2016	Mammal Liver	0.636*
S160225-61	11/10/2015	Black rat (Rattus rattus)	1	POST	4/18/2016	Mammal Liver	0.802
S160225-61	-	-	-	-	5/9/2016	Mammal Liver	1.53
S160225-61	-	-	-	-	5/16/2016	Mammal Liver	0.980*
S160225-62	11/10/2015	Black rat (Rattus rattus)	1	POST	4/18/2016	Mammal Liver	3.38
S160225-62	-	-	-	-	5/9/2016	Mammal Liver	3.39
S160225-63	11/10/2015	Black rat (Rattus rattus)	1	POST	4/18/2016	Mammal Liver	1.22
S160225-63	-	-	-	-	5/9/2016	Mammal Liver	2.39
S160225-63	-	-	-	-	5/9/2016	Mammal Liver	1.86
S160225-64	11/18/2015	Slugs (Deroceras spp. and Limax maximus)	4	POST	4/25/2016	Whole Body	4.67*
S160225-65	11/17/2015	Snail (Euglandina rosea)	1	POST	4/25/2016	Whole Body	1.08
S160225-65	-	-	-	-	5/10/2016	Whole Body	1.08
S160225-66	11/18/2015	Black rat (Rattus rattus)	1	POST	4/18/2016	Mammal Liver	8.34
S160225-66	-	-	-	-	5/9/2016	Mammal Liver	11.5
S160225-67	11/18/2015	Red-billed leiothrix bird (Leiothrix lutea)	1	POST	4/11/2016	Avian Liver	0.862
S160225-68	11/12/2015	Slugs (Limax maximus)	3	POST	4/25/2016	Whole Body	ND

Attachment 1

Sample ID	Sample Collection Date	Species	Number of Individuals in Sample	Pre- or Post- Application	Residue Analysis Date	Tissue Type Analyzed	Diphacinone Concentration (µg/g)
S160225-69	11/12/2015	Slugs (<i>Limax maximus</i>)	4	POST	4/25/2016	Whole Body	0.136
S160225-69	-	-	-	-	5/10/2016	Whole Body	0.180
S160225-69	-	-	-	-	5/10/2016	Whole Body	0.157
S160225-70	12/1/2015	Red-billed leiothrix bird (<i>Leiothrix lutea</i>)	1	POST	4/11/2016	Avian Liver	0.503*
S160225-71	12/1/2015	Red-vented bulbul bird (<i>Pycnonotus cafer</i>)	1	POST	4/11/2016	Avian Liver	ND
S160225-72	11/12/2015	Skinks (<i>Lampropholis delicata</i>)	2	POST	4/27/2016	Whole Body	ND
S160225-73	11/25/2015	Skinks (<i>Lampropholis delicata</i>)	2	POST	4/27/2016	Whole Body	ND
S160225-74	11/18/2015	Skink (<i>Lampropholis delicata</i>)	1	POST	4/27/2016	Whole Body	ND
S160225-75	Nov-15	Caterpillar (unknown species)	1	POST	4/25/2016	Whole Body	0.0301*†
S160225-76	11/9/15-11/13/15	Slugs (<i>Deroceras</i> spp.)	13	POST	4/25/2016	Whole Body	5.45
S160225-76	-	-	-	-	5/10/2016	Whole Body	5.65
S160225-77	11/12/2015	American cockroach (<i>Periplaneta americana</i>)	1	POST	4/25/2016	Whole Body	0.312
S160225-77	-	-	-	-	5/10/2016	Whole Body	0.0778*†
S160225-78	11/18/15-11/19/15	Cockroaches and beetles (multiple species)	9	POST	4/25/2016	Whole Body	0.362*
S160225-79	11/9/2015	Black rat (<i>Rattus rattus</i>)	1	POST	4/18/2016	Mammal Liver	3.35
S160225-79	-	-	-	-	5/9/2016	Mammal Liver	3.11
S160225-80	11/9/2015	Black rat (<i>Rattus rattus</i>)	1	POST	4/18/2016	Mammal Liver	2.70
S160225-80	-	-	-	-	5/9/2016	Mammal Liver	2.79
S160225-81	11/9/2015	Black rat (<i>Rattus rattus</i>)	1	POST	4/18/2016	Mammal Liver	9.16
S160225-81	-	-	-	-	5/9/2016	Mammal Liver	10.7
S160225-82	11/9/2015	Black rat (<i>Rattus rattus</i>)	1	POST	4/18/2016	Mammal Liver	10.8
S160225-82	-	-	-	-	5/9/2016	Mammal Liver	14.3
S160225-83	11/9/2015	Black rat (<i>Rattus rattus</i>)	1	POST	4/18/2016	Mammal Liver	4.21
S160225-83	-	-	-	-	5/9/2016	Mammal Liver	5.10
S160225-84	11/9/2015	House mouse (<i>Mus musculus</i>)	1	POST	4/18/2016	Mammal Liver	32.2*
S160225-85	11/19/2015	Mongoose (<i>Herpestes auropunctatus</i>)	1	POST	5/2/2016	Whole Body	0.809
S160225-85	-	-	-	-	5/16/2016	Whole Body	0.702
S160225-86	11/19/2015	House mouse (<i>Mus musculus</i>)	1	POST	5/2/2016	Whole Body	6.02
S160225-86	-	-	-	-	5/16/2016	Whole Body	3.72*

Attachment 1

Sample ID	Sample Collection Date	Species	Number of Individuals in Sample	Pre- or Post- Application	Residue Analysis Date	Tissue Type Analyzed	Diphacinone Concentration (µg/g)
S160225-87	11/19/2015	House mouse (<i>Mus musculus</i>)	1	POST	5/2/2016	Whole Body	3.48
S160225-87	-	-	-	-	5/16/2016	Whole Body	3.06
S160225-88	11/19/2015	Beetles (multiple species)	66	POST	4/25/2016	Whole Body	0.209•
S160225-88	-	-	-	-	5/10/2016	Whole Body	ND
S160225-88	-	-	-	-	5/16/2016	Whole Body	ND
S160225-89	11/19/2015	Earwigs (Order Dermaptera)	13	POST	4/25/2016	Whole Body	0.189
S160225-89	-	-	-	-	5/10/2016	Whole Body	0.119

ND = Not detected

‡ = Sample was lost during Preparation. No results generated for this sample.

* = Mass of sample was below the recommended minimum for the method. Results should be viewed critically.

† = Sample result was less than the Quantification Limit of the method. Results should be viewed as qualitative only.

• = Sample had an initial positive result. Subsequent re-analysis yielded no detection of diphacinone residues. The first analysis of this sample was likely contaminated in the laboratory and should be disregarded.

Attachment 2

Wildlife Services NWRC National Wildlife Research Center Analytical Services Report	United States Department of Agriculture Animal Plant Health Inspection Service Wildlife Services National Wildlife Research Center Chemistry Lab Unit	Invoice #: 16-014 Date: 05/17/2016 Page: 1 of 10
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To: Aaron Shiels
 Research Biologist
 NWRC

Subject: Determination of Diphacinone Residues in Various Tissues (QA-2523)

Method: R&D "Determination of Anticogulant Residues in Avians and Mammals" (Non-GLP)

Analysis Date: 4/11/16 – 5/16/16

AC Notebook Reference: RD 146, pp. 185-208
 RD 156, pp. 44-52

Analyst: David A. Goldade, Rachael Moulton, and Celeste Samra

Sample Description:

Eighty-nine samples of rats, mice, birds, skinks, snails, slugs, insects, mongooses, and a cat were submitted on 02/25/16 for analysis and are designated as samples S160225-01 through 89. Sample descriptions may be found on pages 3 to 8 of this report.

Additional Comments:

- The data generated as part of this report were not subject to GLP procedures and should be viewed accordingly.
- Sample results were not adjusted for QC recovery.
- For the rats, mice, birds, and cat the liver of the animal was removed and homogenized. In those cases where no liver could be identified (for instance if the body was badly decomposed) the carcass was skinned and homogenized.
- Plans called for analysis of muscle tissue from any game bird whose liver had a positive result for diphacinone. No game bird livers produced a response above the detection limit, therefore no muscle tissue was analyzed.
- In any case where a positive result for diphacinone was observed, every effort was made to duplicate the sample analysis to confirm the result. In some cases insufficient sample existed to permit this re-analysis. In those cases, only one result is listed for the sample.
- In cases where there was significant chromatographic interference, the sample in question would be analyzed a third time if possible.
- The Low Spike Check on the run of 5/2/16 failed to match (>110%). This was likely a fortification error as the recoveries for the low level QC samples was within tolerance. The run was passed and the data accepted.
- Samples S160225-50 and 23 were re-run multiple times as a possible diphacinone response was observed in the samples. In both cases, the response was found to be below the 3X noise criteria necessary to report a positive result.
- Sample S160225-88 had an initial positive result. Subsequent re-analysis of this sample produced no diphacinone response. The first analysis of this sample was likely contaminated in the laboratory and should be disregarded.

 Analyst	5/20/16 5/20/16 Date	 QC Specialist	5/23/16 Date	 Reviewer	5.20.16 Date
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Additional Comments (Continued):

- Sample S160225-49 B was initially run on 5/10/16 and failed to pass with a low surrogate recovery (<50%). The sample was re-run on 5/16/16 and passed all criteria. The original result is not reported.
- Sample S160225-46 A spilled during filtration. Insufficient sample was left to inject on the LC. Diluent was added to the sample vial and the sample was injected. It failed surrogate recovery (<50%). Insufficient sample remained to permit re-analysis of this sample. This result should be viewed critically when deciding whether to include it in the final report.
- Samples S160225-34 A, 35 A, QC-8, and QC-9 were lost due to an instrumental malfunction during SPE clean-up. Samples S160225-34 A and 35 A were subsequently re-analyzed. The two QC samples were lost and are not reported.

Method:

1. Homogenize samples using a SPEX CertiPrep 6850 Freezer Mill liquid nitrogen automated homogenizer.
2. Accurately weigh 0.25 to 0.29 g of homogenized liver, insect, or skink tissue or 0.50 to 0.60 g of homogenized whole body tissue into a 55-mL Teflon MARSPress Teflon tube. Record masses to ± 0.0001 g.
3. Add 20 μ L of Surrogate Fortification Solution (bromophacinone).
4. Add 20 mL of acetonitrile, securely cap the MARS tubes with the MARSPress Capping Station. Vortex mix 10-15 seconds. If tissue adheres to the top of the tube invert and vortex for additional time to suspend the tissue in the solvent.
5. Microwave extract each sample in the MARS by heating the sample to 115°C over 18 minutes, hold for 28 minutes, then cool to ambient temperature for 14 minutes. The method parameters are available in the User Directory as the "ETAC RODENT 115" method.
6. Remove the cooled MARS tubes from the carousel and decant each supernatant using a small funnel into separate 25-mL screw-top glass tubes, taking care to minimize the amount of tissue that is transferred.
7. Reduce each sample to dryness with a stream of N₂ gas in a 60°C N-EVAP.
8. Reconstitute with 1.0 mL of hexane, cap securely, vortex 4-5 seconds, and sonicate 10 minutes.
9. Add 3.0 mL of acetone, cap securely, vortex 4-5 seconds, and sonicate 5 minutes.
10. Filter each sample through a 0.7- μ m glass fiber filter using a 10-mL disposable syringe into a 10-mL screw-top glass tube. Rinse the 25-mL sample tube with 1 mL volumes of both acetone and hexanes and filter through the same syringe filter into the 10-mL tube. Occasionally it is necessary to install a new syringe filter if clogging occurs.
11. Clean-up samples using a 500mg/3-mL STRATA-X-AW SPE cartridge for liver, insects, and skinks or a 200mg/3-mL STRATA-X-AW SPE cartridge for whole body tissue. Do not allow the sorbent to dry during steps a through c.
 - a. Condition the SPE with 3.0 mL of 2:1 acetone:hexanes.
 - b. Load sample from Step 10.
 - c. Wash SPE with 3.0 mL 2:1 acetone:hexanes.
 - d. For whole body analysis only: Wash SPE with 3.0 mL of methanol.
 - e. Dry the SPE by applying a gently vacuum for 1 minute.
 - f. Elute with 8 mL of 15-mM TBAP in acetonitrile solution into a 10-mL screw-top glass tube.
12. Reduce eluate to dryness with a stream of N₂ gas in a 60°C N-EVAP.
13. Add 600 μ L of the 5-mM TBAP in Methanol Solution to each 10-mL tube. Cap, vortex 4-5 seconds, and sonicate 10 minutes.
14. Add 400 μ L of the 5-mM TBAP in pH 8.5 6-mM Phosphate Solution to each tube. Cap and vortex 4-5 seconds.
15. Filter each sample through a 0.45 μ m PTFE filter into HPLC vials for analysis.

Attachment 2

Invoice #: 16-014

Date: 05/17/16

Page: 3 of 10

Instrument Conditions:

Instrument: Agilent 1100 Liquid Chromatograph
 Column: Phenomenex Gemini C18, 3.0 x 150 mm, 3- μ m; or equivalent
 Column Temperature: 55 °C
 Injection Volume: 30 μ L
 Mobile Phase A: 5-mM TBAP in 1:1 pH 8.5 6-mM Phosphate Buffer:MeOH
 Mobile Phase B: 5-mM TBAP in Methanol
 Gradient:

Time (min)	% A	% B	Flow (mL/min)
0.00	90	10	0.500
2.00	90	10	0.500
17.00	15	85	0.500
18.00	0	100	0.750

Run Time: 27.00 minutes
 Post time: 5.00 minutes
 Detector: UV @ 325 nm

Samples were quantified using a three point linear regression calibration curve consisting of: 0.0505 μ g/mL, 0.505 μ g/mL, and 5.05 μ g/mL

Results:

Diphacinone Residues

Sample ID	Analysis Date	Sample Description	Diphacinone Conc. (μ g/g)
S160225-01 A	4/11/2016	1-9/30/15 K-iki Pre-appl. Kalij A1-23 Gulch	ND
S160225-02 A	4/14/2016	2A-8/27/15 Male Mongoose Live Trap	ND
S160225-03 A	4/14/2016	2B-8/27/15 Female Mongoose Doc 250	ND
S160225-04		4A-9/29/15 K-iki Leothrix - Camp Joe	†
S160225-05 A	4/11/2016	4B-9/29/15 K-iki Leothrix - Reveg Rd	ND
S160225-06 A	4/14/2016	5A-9/29/15 K-iki R. rattus Female VP 115g Trap A3-12 overgas - Gulch	ND
S160225-07 A	4/14/2016	5B-9/29/15 K-iki R. exulans Trap A1-1 overgas - Gulch	ND
S160225-08 A	4/27/2016	6A-9/29/15 3 skinks Trap G25 bottom of gulch	ND
S160225-09 A	4/27/2016	6B-9/29/15 K-iki 2 skinks A3-10 - Gulch	ND
S160225-10 A	4/27/2016	6C-9/29/15 K-iki 2 skinks A3-10; 9/29/15 1 skink G25 lower gulch	ND
S160225-11 A	4/22/2016	7-9/29/15 Limax maximus slug - Camp Joe gulch	ND
S160225-12 A	4/14/2016	8-9/29/15 K-iki Male Mongoose TD A1-23 - Gulch	ND

† = Sample was lost during preparation. No results generated for this sample.

Attachment 2

Invoice #: 16-014

Date: 05/17/16

Page: 4 of 10

Results:

Diphacinone Residues

Sample ID	Analysis Date	Sample Description	Diphacinone Conc. (ug/g)
S160225-13 A	4/22/2016	9-10/29/15 Limax maximus and Deroceras – Found in Kahana-iki pitfall traps	ND
S160225-14 A	4/14/2016	10-9/24/15 Female Mongoose A3-8 - Gulch	ND
S160225-15 A	4/22/2016	3-10/31/15 Limax maximus slugs - Gulch	ND
S160225-16 A	4/22/2016	11-10/31/15 Euglandina snail A3-18 - Gulch	ND
S160225-17 A	4/14/2016	12-9/22/15 Cat DOC250-A1 - Lower gulch	ND
S160225-17 B	5/9/2016		ND
S160225-18 A	4/22/2016	13-9/23/15 Cockroaches various locations (5 samples total)	ND*
S160225-19 A	4/22/2016	14-9/23/15 3 Deroceras slugs - Gulch; 1 Megmatium slug - Flats (3 samples total)	ND
S160225-20 A	4/27/2016	15A-9/22/15 3 Skinks G25 and A3-10 (2 bags total)	ND
S160225-21 A	4/27/2016	15B-9/22/15 6 Skinks G25, A1, and A3 (6 samples total)	ND
S160225-22 A	4/14/2016	16A-12/18/14 R. rattus - Switchback	ND
S160225-23 A	4/14/2016	16B-12/18/14 R. rattus - Switchback	ND
S160225-23 B	5/9/2016		ND
S160225-24 A	4/14/2016	16C-12/18/14 R. rattus - Switchback	ND
S160225-25 A	4/14/2016	16D-12/18/14 R. rattus - Pahole Gulch	ND
S160225-26 A	4/14/2016	16E-12/18/14 R. rattus - Pahole Gulch	ND
S160225-27 A	4/22/2016	17-10/14/15 9 Deroceras slugs - Lower Gulch (2 bags total)	ND*
S160225-28 A	5/2/2016	18A-10/15/15 R. exulans Female collared 165.349 47g eaten after 1 d	ND
S160225-29 A	4/14/2016	18B-10/15/15 R. rattus female vp 115g collared 164.0185 trap A1-17 died hypothermia - Gulch	ND
S160225-30 A	4/11/2016	19-10/15/15 Red-billed Leotrix dead in trap - Camp Joe	ND*
S160225-31 A	4/11/2016	20-9/30/15 K-iki Leotrix trap A3-17	ND
S160225-32 A	4/11/2016	21-10/9/15 Kalij from Pahole Chris Miller gave to Serdp	ND

*= Mass of sample was below recommended minimum. Results should be viewed critically.

Attachment 2

Invoice #: 16-014

Date: 05/17/16

Page: 5 of 10

Results:

Diphacinone Residues

Sample ID	Analysis Date	Sample Description	Diphacinone Conc. (µg/g)
S160225-33 A	4/22/2016	22-9/30/15 Long-legged Anogra (ants) (5 bags total)	ND*
S160225-34 A	4/18/2016	23A-12/1/15 R. rattus female Found under G44 A24 by A1-4 broadcast TBO	0.286
S160225-35 A	4/18/2016	23B-12/1/15 R. rattus at 01-17 Dead on trail TBO	1.29
S160225-36 A	5/2/2016	23C-12/1/15 R. rattus Decomposed M2-6 TBO	3.40
S160225-36 B	5/16/2016		3.14
S160225-37 A	4/14/2016	23D-12/1/15 R. exulans found on trail at S-1	0.438
S160225-37 B	5/9/2016	pretty fresh TBO	0.0993†
S160225-38 A	5/2/2016	23E-12/1/15 M. musculus really decomposed	2.50
S160225-38 B	5/16/2016	by A3-16 TBO	1.41
S160225-39 A	4/11/2016	24-Erckel froncolin Uncertained when collected	ND
S160225-40 A	4/11/2016	25-12/1/15 Kalij male A1-23 TBO	ND
S160225-41 A	4/14/2016	26A-11/25/15 R. rattus dead on trail M2-17 - Flats	11.6
S160225-41 B	5/9/2016		11.1
S160225-42 A	4/22/2016	26B-11/25/15 17 Cockroaches - Camp Joe (2 samples)	ND
S160225-43 A	4/22/2016	26C-11/28/15 Euglandia rosea snail on Pahole Trail	0.257
S160225-43 B	5/10/2016		0.364
S160225-44 A	4/18/2016	27-11/15/15 Mouse Aaron	3.21*
S160225-45 A	4/11/2016	28A-11/24/15 Shama between A3-A1 trails by guava clearing TBO	ND*
S160225-46 A	4/11/2016	28B-11/24/15 Leothrix shot at S-15 TBO	1.17*
S160225-47 A	4/11/2016	29-12/1/15 Leothrix at S-6 TBO	0.535*
S160225-48 A	4/22/2016	30A-11/25/15 Approx. 50 Nitidulid beetles Camp Joe beer traps	0.0394†
S160225-48 B	5/10/2016		0.0462†
S160225-49 A	4/22/2016	30B-11/25/15 Approx. 30 Earwigs Camp Joe beer traps	0.0977
S160225-49 B	5/16/2016		0.130
S160225-50 A	4/22/2016	30C-11/25/15 Approx. 100 Amphipods Camp Joe beer traps	ND
S160225-50 B	5/10/2016		ND
S160225-50 C	5/10/2016		ND

* = Mass of sample was below recommended minimum. Results should be viewed critically.

† = Sample result is less than QL. Results should be viewed as qualitative only.

Attachment 2

Invoice #: 16-014

Date: 05/17/16

Page: 6 of 10

Results:

Diphacinone Residues

Sample ID	Analysis Date	Sample Description	Diphacinone Conc. (µg/g)
S160225-51 A	4/22/2016	30D-11/25/15 Approx. 40 Rove Beetles Camp Joe	0.329
S160225-51 B	5/10/2016	beer traps	0.402
S160225-52 A	4/25/2016	30E-11/25/15 Approx. 15 Deroceras/Limax slugs	3.53
S160225-52 B	5/10/2016	Camp Joe beer traps	2.99
S160225-53 A	4/25/2016	30F-11/25/15 Cockroach B52 Camp Joe beer traps	0.244*
S160225-54 A	4/25/2016	30G-11/25/15 Approx. 12 slugs (Deroceras and 3 Limax)	9.83
S160225-54 B	5/10/2016	- includes canopy bag slug samples (3 samples total)	6.37
S160225-55 A	4/18/2016	31A-11/11/15 R. exulans 01-9 Serdp found	1.83
S160225-56 A	4/18/2016	31B-11/11/15 R. exulans Serdp found near 01-9	3.86
S160225-57 A	4/18/2016	31C-11/11/15 R. exulans On ground Maile flats B1-1 looks 1-2 day old after 2nd appl.	2.44*
S160225-58 A	4/18/2016	31D-11/11/15 R. exulans on ground 1 day	1.08
S160225-58 B	5/9/2016	after 2nd appl. Maile Flats B1-1	1.21
S160225-59 A	4/18/2016	31E-11/11/15 R. exulans on ground 1 day after 2nd appl. Maile Flats B1-1	0.778*
S160225-60 A	4/18/2016	32A-11/10/15 R. rattus access trail prior switchback EL	0.636*
S160225-61 A	4/18/2016	32B-11/10/15 R. rattus STA A-4-15	0.802
S160225-61 B	5/9/2016		1.53
S160225-61 C	5/16/2016		0.980*
S160225-62 A	4/18/2016	32C-11/10/15 R. rattus A1-3/A1-4 PR	3.38
S160225-62 B	5/9/2016		3.39
S160225-63 A	4/18/2016	32D-11/10/15 R. rattus M1-01 MV RR	1.22
S160225-63 B	5/9/2016		2.39
S160225-63 C	5/9/2016		1.86
S160225-64 A	4/25/2016	33A-11/18/15 3 Deroceras slugs and 1 Limax slug various locations	4.67*
S160225-65 A	4/25/2016	33B-11/17/15 Euglandia snail 01-11 Maile Flats	1.08
S160225-65 B	5/10/2016		1.08
S160225-66 A	4/18/2016	34-11/18/15 R. rattus G25 (lower gulch) 8 d after	8.34
S160225-66 B	5/9/2016	2nd appl.	11.5
S160225-67 A	4/11/2016	35-11/18/15 Leothrix S7 - Gulch	0.862

* = Mass of sample was below recommended minimum. Results should be viewed critically.

† = Sample result is less than QL. Results should be viewed as qualitative only.

Attachment 2

Invoice #: 16-014

Date: 05/17/16

Page: 7 of 10

Results:

Diphacinone Residues

Sample ID	Analysis Date	Sample Description	Diphacinone Conc. (µg/g)
S160225-68 A	4/25/2016	36A-11/12/15 3 Limax slugs from pitfalls - Ethan's Gulch	ND
S160225-69 A	4/25/2016	36B-11/12/15 4 Limax slugs from pitfalls - Camp Joe	0.136
S160225-69 B	5/10/2016		0.180
S160225-69 C	5/10/2016		0.157
S160225-70 A	4/11/2016	37-12/1/15 Leothrix at S-1 TBO	0.503*
S160225-71 A	4/11/2016	38-12/1/15 Bulbul A3-14 TBO	ND
S160225-72 A	4/27/2016	39A-11/12/15 2 Skinks at A3-15 (2 bags total)	ND
S160225-73 A	4/27/2016	39B-11/25/15 2 Skinks at A3-16 (2 bags total)	ND
S160225-74 A	4/27/2016	39C-11/18/15 Skink Maile Flats 01-9	ND
S160225-75 A	4/25/2016	40- Caterpillar	0.0301†
S160225-76 A	4/25/2016	41-11/9/15-11/13/15 13 Deroceras slugs various locations	5.45
S160225-76 B	5/10/2016		5.65
S160225-77 A	4/25/2016	42-11/12/15 B52 Cockroach in Flats 01-6 canopy bag	0.312
S160225-77 B	5/10/2016		0.0778†
S160225-78 A	4/25/2016	43-11/18/15-11/19/15 7 Cockroaches and 2 Click Beetles - Maile Flats	0.362*
S160225-79 A	4/18/2016	44A-11/9/15 R. rattus M1-01 MV	3.35
S160225-79 B	5/9/2016		3.11
S160225-80 A	4/18/2016	44B-11/9/15 R. rattus Around perimeter by switchbacks JT	2.70
S160225-80 B	5/9/2016		2.79
S160225-81 A	4/18/2016	44C-11/9/15 R. rattus Near M2-1	9.16
S160225-81 B	5/9/2016		10.7
S160225-82 A	4/18/2016	44D-11/9/15 R. rattus M1-15 MV	10.8
S160225-82 B	5/9/2016		14.3
S160225-83 A	4/18/2016	44E-11/9/15 R. rattus at S-9 JR	4.21
S160225-83 B	5/9/2016		5.10
S160225-84 A	4/18/2016	45-11/9/15 M. musculus M1-6 MV	32.2*
S160225-85 A	5/2/2016	46-11/19/15 Mongoose partly decomposed Maile	0.809
S160225-85 B	5/16/2016	Flats M2-4	0.702

* = Mass of sample was below recommended minimum. Results should be viewed critically.

† = Sample result is less than QL. Results should be viewed as qualitative only.

Attachment 2

Invoice #: 16-014

Date: 05/17/16

Page: 8 of 10

Results:

Diphacinone Residues

Sample ID	Analysis Date	Sample Description	Diphacinone Conc. (µg/g)
S160225-86 A	5/2/2016	47A-11/19/15 M. musculus decomposed Maile Flats	6.02
S160225-86 B	5/16/2016	Pohole Trail very little tissue	3.72*
S160225-87 A	5/2/2016	47B-11/19/15 2 M. musculus - Gulch	3.48
S160225-87 B	5/16/2016		3.06
S160225-88 A	4/25/2016	48-11/19/15 66 small beetles collected from	0.209
S160225-88 B	5/10/2016	beer traps - Camp Joe	ND
S160225-88 C	5/16/2016		ND
S160225-89 A	4/25/2016	49-11/19/15 13 Earwigs collected from beer	0.189
S160225-89 B	5/10/2016	traps - Camp Joe	0.119

* = Mass of sample was below recommended minimum. Results should be viewed critically.

† = Sample result is less than QL. Results should be viewed as qualitative only.

Detection Limit:

The detection limit (DL) was estimated from the mean chromatographic response of unfortified control samples compared to control samples that have been fortified to the level specified below with diphacinone. The DL is defined as the concentration of diphacinone required to generate a signal equal to 3X the baseline noise (measured peak-to-peak) observed in the control sample at the retention time of diphacinone. Under the conditions stipulated in the method the DL for diphacinone in each matrix is given below.

Quantitation Limit:

The quantitation limit (QL) was estimated from the mean chromatographic response of unfortified control samples compared to control samples that have been fortified to the level specified below with diphacinone. The DL is defined as the concentration of diphacinone required to generate a signal equal to 10X the baseline noise (measured peak-to-peak) observed in the control sample at the retention time of diphacinone. Under the conditions stipulated in the method the QL for diphacinone in each matrix is given below.

Matrix	n	Fortification Level (µg/g)	Detection Limit (µg/g)	Quantitation Limit (µg/g)
Avian Liver	2	0.367	0.071	0.24
Mammal Liver	5	0.370	0.033	0.11
Insects	6	0.375	0.025	0.083
Skinks	2	0.367	0.045	0.15
Mammal Whole Body	4	0.193	0.016	0.054

Attachment 2

Invoice #: 16-014

Date: 05/17/16

Page: 9 of 10

Quality Control Results:

Avian Liver

<u>Sample ID</u>	<u>Analysis Date</u>	<u>Observed Conc. (µg/g)</u>	<u>Target Conc. (µg/g)</u>	<u>Percent Recovery</u>
QC-1	4/11/2016	ND	Control	-----
QC-2	4/11/2016	ND	Control	-----
QC-3	4/11/2016	0.384	0.386	99.5%
QC-4	4/11/2016	0.371	0.347	107%
QC-5	4/11/2016	3.48	3.56	97.8%
QC-6	4/11/2016	3.60	3.65	98.6%

Mammal Liver

<u>Sample ID</u>	<u>Analysis Date</u>	<u>Observed Conc. (µg/g)</u>	<u>Target Conc. (µg/g)</u>	<u>Percent Recovery</u>
QC-7	4/14/2016	ND	Control	-----
QC-8	4/14/2016	*		
QC-9	4/14/2016	*		
QC-10	4/14/2016	0.350	0.382	91.6%
QC-11	4/14/2016	3.68	3.64	101%
QC-12	4/14/2016	3.32	3.30	101%
QC-13	4/18/2016	ND	Control	-----
QC-14	4/18/2016	ND	Control	-----
QC-15	4/18/2016	0.402	0.377	107%
QC-16	4/18/2016	0.367	0.359	102%
QC-17	4/18/2016	3.88	3.75	103%
QC-18	4/18/2016	3.76	3.89	96.7%
QC-43	5/9/2016	ND	Control	-----
QC-44	5/9/2016	ND	Control	-----
QC-45	5/9/2016	0.366	0.364	101%
QC-46	5/9/2016	0.397	0.369	108%
QC-47	5/9/2016	3.93	3.71	106%
QC-48	5/9/2016	4.10	3.69	111%

Insects

<u>Sample ID</u>	<u>Analysis Date</u>	<u>Observed Conc. (µg/g)</u>	<u>Target Conc. (µg/g)</u>	<u>Percent Recovery</u>
QC-19	4/22/2016	ND	Control	-----
QC-20	4/22/2016	ND	Control	-----
QC-21	4/22/2016	0.350	0.355	98.6%
QC-22	4/22/2016	0.375	0.398	94.2%
QC-23	4/22/2016	3.75	3.95	94.9%
QC-24	4/22/2016	3.61	3.80	95.0%

* = Sample lost due to instrument malfunction during SPE clean-up.

Attachment 2

Invoice #: 16-014

Date: 05/17/16

Page: 10 of 10

Quality Control Results:

Insects

<u>Sample ID</u>	<u>Analysis Date</u>	<u>Observed Conc. (µg/g)</u>	<u>Target Conc. (µg/g)</u>	<u>Percent Recovery</u>
QC-25	4/25/2016	ND	Control	-----
QC-26	4/25/2016	ND	Control	-----
QC-27	4/25/2016	0.376	0.373	101%
QC-28	4/25/2016	0.381	0.389	97.9%
QC-29	4/25/2016	3.85	3.85	100%
QC-30	4/25/2016	3.81	3.87	98.4%
QC-49	5/10/2016	ND	Control	-----
QC-50	5/10/2016	ND	Control	-----
QC-51	5/10/2016	0.328	0.331	99.1%
QC-52	5/10/2016	0.354	0.365	97.0%
QC-53	5/10/2016	3.95	3.99	99.0%
QC-54	5/10/2016	4.00	3.75	107%

Skinks

<u>Sample ID</u>	<u>Analysis Date</u>	<u>Observed Conc. (µg/g)</u>	<u>Target Conc. (µg/g)</u>	<u>Percent Recovery</u>
QC-31	4/27/2016	ND	Control	-----
QC-32	4/27/2016	ND	Control	-----
QC-33	4/27/2016	0.348	0.368	94.6%
QC-34	4/27/2016	0.363	0.365	99.5%
QC-35	4/27/2016	3.39	3.70	91.6%
QC-36	4/27/2016	3.71	3.97	93.5%

Mammal Whole Body

<u>Sample ID</u>	<u>Analysis Date</u>	<u>Observed Conc. (µg/g)</u>	<u>Target Conc. (µg/g)</u>	<u>Percent Recovery</u>
QC-37	5/2/2016	ND	Control	-----
QC-38	5/2/2016	ND	Control	-----
QC-39	5/2/2016	0.194	0.201	96.5%
QC-40	5/2/2016	0.186	0.193	96.4%
QC-41	5/2/2016	1.98	2.00	99.0%
QC-42	5/2/2016	1.88	1.94	96.9%
QC-55	5/16/2016	ND	Control	-----
QC-56	5/16/2016	ND	Control	-----
QC-57	5/16/2016	0.169	0.186	90.9%
QC-58	5/16/2016	0.178	0.193	92.2%
QC-59	5/16/2016	1.78	1.87	95.2%
QC-60	5/16/2016	1.69	1.87	90.4%

